UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,268	05/11/2001	Takakazu Shiomi	NAK1-BO82	8260

21611 7590 10/27/2004

SNELL & WILMER LLP
1920 MAIN STREET
SUITE 1200
IRVINE, CA 92614-7230

EXAMINER	
ALI, SYED J	

ART UNIT	PAPER NUMBER
2127	

DATE MAILED: 10/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/854,268	SHIOMI ET AL.	
	Examiner	Art Unit	
	Syed J Ali	2127	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 May 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 May 2001* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *July 24, 2001*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-57 are pending in this application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 1-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

4. The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. **Claims 1-32 and 37-43 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.**

7. Claims 1, 20, 27, 37, and 42 are directed to an apparatus, but are not tangibly embodied on any sort of physical medium. The kernel unit and library unit are implemented as software modules, and are not tangibly embodied. Claims 2-19, 21-26, 28-32, 38-41, and 43 are rejected for similar reasons as stated for claims 1, 20, 27, 37, and 42, respectively, as they fail to present any limitations resolving the deficiencies of the claim from which they depend.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. **Claims 1-8, 17-19, 27-34, 36-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Seikichi (JPO 08123700) (hereinafter Seikichi).**

10. As per claim 1, Seikichi teaches the invention as claimed, including an application execution apparatus comprising a kernel unit and at least one library unit which provides resources to applications,

wherein the kernel unit includes notifying means for notifying, when an application is completed, each library unit which has provided a resource to the application, of the application (paragraphs 0024-0027); and

each library unit includes collecting means for collecting the resource provided to the application, upon receiving the notification from the notifying means (paragraphs 0012-0013; 0025-0027).

11. As per claim 2, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 1, wherein the collecting means includes:

table holding means for holding a table which shows a correspondence between applications and resources provided to the applications (paragraphs 0022-0023); and

resource specifying means for specifying the resource provided to the application notified by the notifying means, based on the table in the table holding means (paragraphs 0022-0023).

12. As per claim 3, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 2, wherein each library unit further includes:

providing means for providing the resource to the application, in accordance with a request from the application (paragraphs 0022-0023);

registering means for receiving from the kernel unit a notification of the application provided with the resource, and registering a correspondence of the application and the resource into the table in the table holding means (paragraphs 0022-0023) and

deleting means for deleting, when the collecting means collects the resource provided to the application, the correspondence of the application and the resource from the table (paragraphs 0012-0013; 0025-0027).

13. As per claim 4, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 1, wherein each library unit further includes:

providing means for providing the resource to the application in accordance with a request from the application (paragraphs 0022-0023); and

requesting means for requesting, when the providing means first provides the resource to the application, the notifying means to make the notification when the application is completed (paragraphs 0024-0027).

14. As per claim 5, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 4, wherein the requesting means requests the notifying means to make the notification by calling a callback function (paragraphs 0024-0027), and

the notifying means makes the notification by calling and executing the callback function, when the application is completed (paragraphs 0024-0027).

15. As per claim 6, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 1, wherein the notifying means includes a plurality of notifying units which each correspond to a different application, and

each library unit further includes:

providing means for providing the resource to the application, in accordance with a request from the application (paragraphs 0022-0023); and

requesting means for requesting, when the providing means first provides the resource to the application, a notifying unit corresponding to the application to make the notification when the application is completed (paragraphs 0024-0027).

16. As per claim 7, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 6, wherein the requesting means requests the notifying unit to make the notification by calling a method of a resource collection instance (paragraphs 0029-0030), the resource collection instance being generated by the library unit to receive the notification (paragraphs 0024-0027; 0029-0030), and

the notifying unit makes the notification by calling the method of the resource collection instance, when the application is completed (paragraphs 0024-0027; 0029-0030).

17. As per claim 8, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 1, wherein when at least two applications are completed at the same time, the notifying means notifies each library unit which has provided resources to the applications (paragraphs 0024-0027), of the applications, the collecting means includes:

table holding means for holding a table showing a correspondence between applications and resources provided to the applications (paragraphs 0022-0023); and

resource specifying means for specifying the resources provided to the applications notified by the notifying means, based on the table in the table holding means (paragraphs 0022-0023), and

the collecting means collects the specified resources (paragraphs 0012-0013; 0025-0027).

18. As per claim 17, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 1, wherein the notifying means makes the notification when the application is completed or suspended, each library unit further includes:

judging means for judging whether the resource provided to the application should be collected, depending on whether the application has been completed or suspended (paragraphs 0012-0013; 0025-0027), and

the collecting means collects the resource provided to the application, when the judging means judges that the resource should be collected (paragraphs 0012-0013; 0025-0027).

19. As per claim 18, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 17, wherein the notifying means includes a plurality of notifying units which each correspond to a different application, and each library unit further includes:

providing means for providing the resource to the application, in accordance with a request from the application (paragraphs 0022-0023); and

requesting means for requesting, when the providing means first provides the resource to the application, a notifying unit corresponding to the application to make the notification when the application is completed or suspended (paragraphs 0012-0013; 0025-0027).

20. As per claim 19, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 18, wherein the requesting means requests the notifying unit to make the notification by calling a method of a resource collection instance, the resource collection instance being generated by the library unit to receive the notification,

the notifying unit makes the notification by calling the method of the resource collection instance, when the application is completed or suspended (paragraphs 0024-0027; 0029-0030), and

the judging means (a) receives the notification (paragraphs 0012-0013; 0025-0027), (b) acquires information showing whether the application has been completed or suspended (paragraphs 0012-0013; 0025-0027), and (c) judges whether the resource should be collected, depending on the acquired information (paragraphs 0012-0013; 0025-0027).

21. As per claim 27, Seikichi teaches the invention as claimed, including an application execution apparatus comprising a middleware unit and an OS unit which provides resources to applications, wherein the middleware unit includes:

notifying means for (a) notifying the OS unit of an application which requests resources, in accordance with a request from the OS unit (paragraphs 0024-0027), and (b) notifying the OS unit of the application when the application is completed (paragraphs 0024-0027), and the OS unit includes:

requesting means for requesting the notifying means to notify of the application which requests the resources (paragraphs 0024-0027);

resource management table holding means for holding a table showing a correspondence between applications notified by the notifying means and resource names of provided resources (paragraphs 0022-0023); and

resource collecting means for specifying, when notified by the notifying means of the application which is completed, the resources corresponding to the notified application based on the table in the resource management table holding means, and collecting the specified resources (paragraphs 0012-0013; 0025-0027).

22. As per claim 28, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 27, wherein the notifying means includes:

loader specifying means for specifying a class loader that loaded the application which requests the resources (paragraphs 0017-0019);

table holding means for holding a table showing a correspondence between loaded applications and class loaders which loaded the applications (paragraphs 0022-0023); and

application specifying means for specifying the application corresponding to the specified class loader, based on the table in the table holding means (paragraphs 0022-0023).

23. As per claim 29, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 28, wherein the loader specifying means specifies the class loader, by referencing a stack which stores information on a caller of a class of the application (paragraphs 0017-0019).

24. As per claim 30, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 29, wherein the OS unit further includes:

assigning means for assigning an application ID to each application (paragraphs 0022-0023), and

the notifying means notifies the OS unit of the application which requests the resource by notifying the OS unit of an application ID of the application (paragraphs 0022-0023), and

notifies the OS unit of the application which is completed by notifying the OS unit of the application ID of the application (paragraphs 0022-0023).

25. As per claim 31, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 28, wherein the OS unit further includes:

assigning means for assigning an application ID to each application (paragraphs 0017-0019, 0022-0023), and

the notifying means notifies the OS unit of the application which requests the resource by notifying the OS unit of an application ID of the application (paragraphs 0017-0019, 0022-0023), and

notifies the OS unit of the application which is completed by notifying the OS unit of the application ID of the application (paragraphs 0017-0019, 0022-0023).

26. As per claim 32, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 27, wherein the OS unit further includes:

assigning means for assigning an application ID to each application (paragraphs 0017-0019, 0022-0023), and

the notifying means notifies the OS unit of the application which requests the resource by notifying the OS unit of an application ID of the application, and notifies the OS unit of the application which is completed by notifying the OS unit of the application ID of the application (paragraphs 0017-0019, 0022-0023).

27. As per claim 33, Seikichi teaches the invention as claimed, including a computer-readable recording medium recording a program for use in an application execution apparatus equipped with a kernel unit and a plurality of library units which provide resources to applications, the program comprising:

a notifying step in the kernel unit for notifying, when an application is completed, each library unit which has provided a resource to the application, of the application (paragraphs 0024-0027); and

a collecting step in each library unit for collecting the resource provided to the applications upon receiving the notification (paragraphs 0012-0013; 0025-0027).

28. As per claim 34, Seikichi teaches the invention as claimed, including the computer-readable recording medium of claim 33, wherein the notifying step makes the notification when the application is completed or suspended (paragraphs 0024-0027), the program further comprises a judging step in each library unit for judging whether the resource provided to the application should be collected, depending on whether the application has been completed or

suspended, and the collecting step collects the resource provided to the application, when the judging step judges that the resource should be collected (paragraphs 0012-0013; 0025-0027).

29. As per claim 36, similar limitations are presented as in claim 27. Therefore, the discussion of claim 27 is relevant to claim 36 as well.

30. As per claims 37-57, Seikichi teaches the invention as claimed, including application of the garbage collection technique claimed above to a heap memory structure (paragraphs 0017-0019), and a locking technique that suspends the execution of applications while garbage collection is being performed (paragraphs 0029-0034).

Claim Rejections - 35 USC § 103

31. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

32. **Claims 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seikichi.**

33. As per claim 9, Seikichi does not specifically teach the invention as claimed, including the application execution apparatus of claim 1, wherein the resources include a tuner, an MPEG decoder, a remote control, a file system, a memory, and a modem.

34. "Official Notice" is taken that the above named resources are well known and expected in the art. These resources are very common in computing systems, especially those that are designed with multimedia capabilities in mind. Multimedia systems are resource intensive and require significant multitasking and overhead, and would greatly benefit from a dynamic garbage collection scheme, such as the one provided by Seikichi.

35. As per claims 10-16, similar limitations are presented as in claims 2-8, respectively. Therefore, the discussion of claims 2-8 is relevant to claims 10-16 as well.

36. **Claims 20-22, 26, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seikichi in view of Alexander, III et al. (USPN 6,560,773) (hereinafter Alexander).**

37. As per claim 20, Seikichi teaches the invention as claimed, including an application execution apparatus comprising an OS (Operating System) unit which provides resources to applications, including:

first table holding means for holding a table which shows a correspondence between applications, tasks corresponding to the applications, and threads which make up each task (paragraphs 0022-0023); and

notifying means for notifying, upon receiving an instruction to complete an application, the OS unit of a task corresponding the application, based on the table in the first table holding means (paragraphs 0024-0027), and the OS unit includes:

task generating means for generating the task for executing the application (paragraphs 0001-0006);

thread generating means for generating application threads which make up the task generated by the task generating means (paragraphs 0001-0006);

controlling means for executing the generated application threads to execute program codes of the application (paragraphs 0001-0006), providing resources to the application in accordance with a request from the application (paragraphs 0022-0023), and registering a correspondence between the provided resources and the task to which the application threads belong, into a table showing a correspondence between provided resources and tasks corresponding to applications (paragraphs 0022-0023); and

collecting means for specifying the resources corresponding to the task notified by the notifying means based on the table in the controlling means, and collecting the specified resources (paragraphs 0012-0013; 0025-0027).

38. Alexander teaches the invention as claimed, including a Java middleware unit (col. 6 lines 46-67) and a garbage collector to collect resources in the Java middleware unit (col. 9 lines 41-45; col. 22 lines 8-42). Many of the claimed features that are shown by the teachings of Seikichi are present in Alexander as well.

39. It would have been obvious to one of ordinary skill in the art to combine Seikichi and Alexander since effective garbage collection is central to Java programming, in particular, execution in a virtual machine environment. Java has built in garbage collection techniques, but memory leaks still may occur on occasion. Seikichi provides a method of performing garbage collection after a program has completed execution, thereby restoring memory that is no longer in use, which can be supplemented by the garbage collection performed by Alexander that attempts to identify memory leaks during execution and deallocates memory objects during the execution of a program.

40. As per claim 21, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 20, wherein the Java middleware unit further includes :

requesting means for requesting to notify the application which is being executed, of a change of a status of a device (paragraphs 0020-0023); and

status change notifying means for notifying the application of the change, upon detecting the change (paragraphs 0020-0023).

41. As per claim 22, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 21, wherein the requesting means requests the status change notifying means to call a listener which waits to be informed of the change (paragraphs 0017-0019); and

the status change notifying means makes the notification by calling the listener, upon detecting the change (paragraphs 0017-0019).

42. As per claim 26, Seikichi teaches the invention as claimed, including the application execution apparatus of claim 20, wherein the Java middleware unit further includes:

resource reserve thread generating means for generating a resource reserve thread for reserving resources necessary for the Java middleware unit (paragraphs 0017-0019); and

resource reserving means for reserving the resources necessary for the Java middleware unit, by executing the resource reserve thread (paragraphs 0017-0019), and

the collecting means specifies the resources corresponding to the notified task based on the table in the controlling means, and collects the specified resources, without collecting the resources reserved by the resource reserving means (paragraphs 0012-0013; 0025-0027).

43. As per claim 35, similar limitations are presented as in claim 20. Therefore, the discussion of claim 20 is relevant to claim 35 as well.

44. **Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seikichi in view of Alexander in view of Konuru et al. (USPN 6,654,948) (hereinafter Konuru).**

45. As per claim 23, Konuru teaches the invention as claimed, including the application execution apparatus of claim 22, wherein the status change notifying means generates a special thread for calling the listener, and calls the listener by executing the special thread, the Java middleware unit further includes:

second table holding means for holding a table showing a correspondence between listeners, special threads, and applications (col. 11 lines 27-53); and

table renewing means for referencing the table in the second table holding means when the requesting means requests the status change notifying means to call the listener, judging whether the application corresponding to the listener is shown in the table, and adding the listener to the table in correspondence with the application if the application is shown in the table (col. 6 lines 4-38; col. 8 lines 43-67; col. 11 lines 27-53), and

the status change notifying means does not generate the special thread if the table renewing means judges that the application is shown in the table, and generates the special thread if the table renewing means judges that the application is not shown in the table (col. 6 lines 4-38; col. 8 lines 43-67; col. 11 lines 27-53).

46. It would have been obvious to one of ordinary skill in the art to combine Seikichi, Alexander, and Konuru since the method of Konuru makes available a wide variety of functions pertaining to monitoring execution of threads, tasks, and processes. As the garbage collection methods set forth by Seikichi and Alexander rely heavily on execution monitoring, the methods provided by Konuru for monitoring events in an object oriented system would facilitate the resource management and garbage collection techniques discussed above.

47. As per claim 24, Konuru teaches the invention as claimed, including the application execution apparatus of claim 23, wherein the special thread monitors whether information showing the occurrence of the change is held in a queue which transfers information between threads, and calls the listener upon detecting that the information is held in the queue (col. 6 lines 4-38; col. 8 lines 43-67).

48. As per claim 25, Konuru teaches the invention as claimed, including the application execution apparatus of claim 23, wherein the special thread is in a wait state before information showing the occurrence of the change is held in a queue which transfers information between threads, and becomes active and calls the listener when the information is held in the queue (col. 6 lines 4-38; col. 8 lines 43-67).

Conclusion

49. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
October 14, 2004

MENG-AL T. AN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100